NRL 5700

Defense Science and Technology Seminar
on Emerging Technologies

Micro Air Vehicles

"Alternative MAV Navigation, Missions and Configurations"

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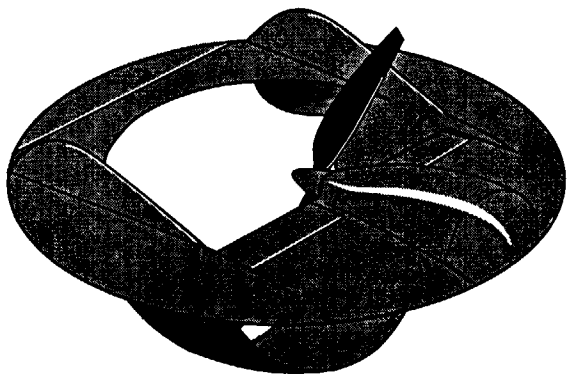

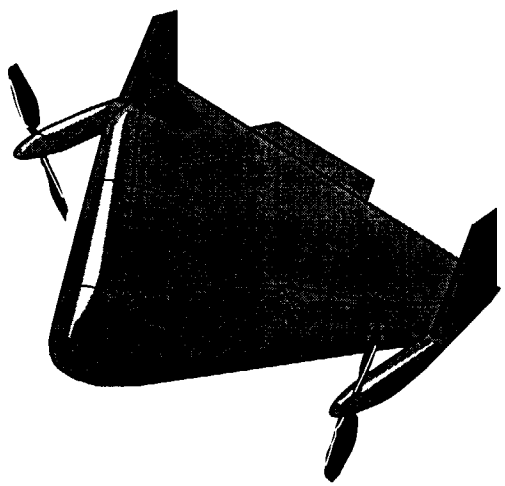

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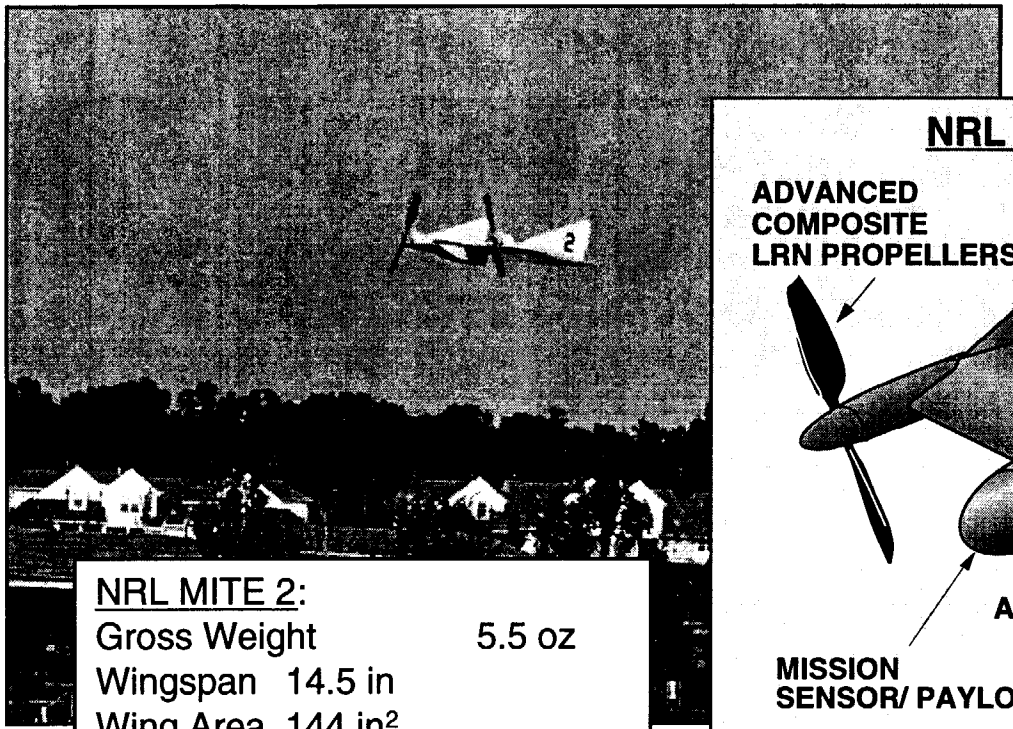
MICRO TACTICAL EXPENDABLE

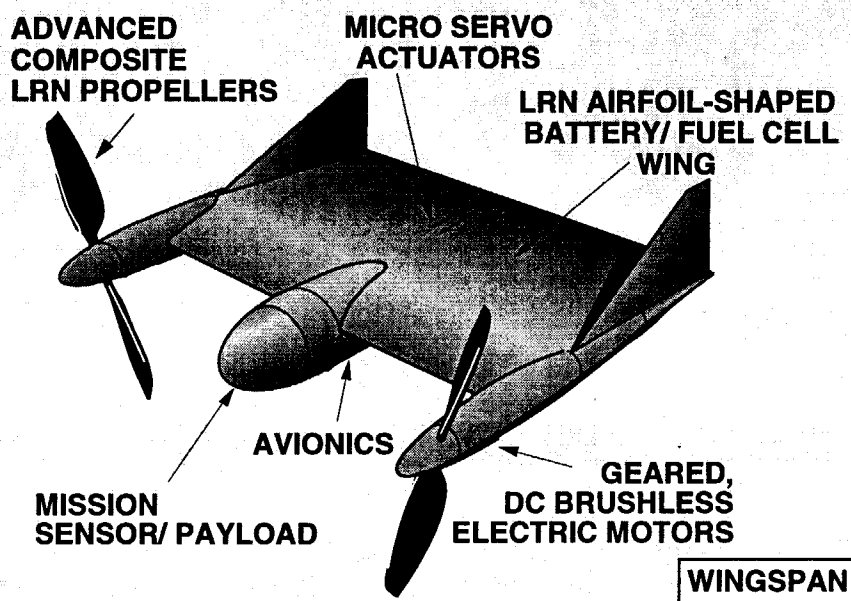
MITE



NRL MITE 2:

Gross Weight	5.5 oz
Wingspan 14.5 in	
Wing Area 144 in^2	
Payload Weight	~ 1 oz
Speed	~ 15 mph
Control: R/C proportional	

NRL BASELINE DESIGN MAV



WINGSPAN	• 15 cm
LENGTH	• 15 cm
PROP DIA.	• 12 cm
MASS	• 40 g
AIRSPEED	• 10 m/s

Micro-Jammer - Current Program

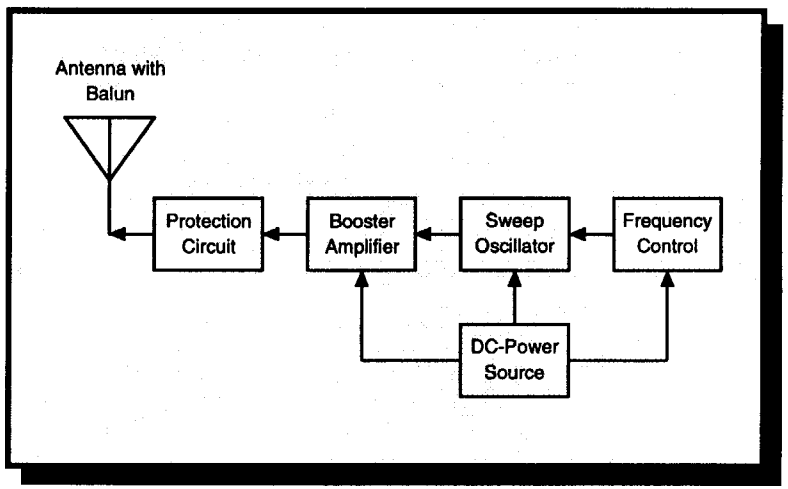
1st Generation

1st Generation Prototype

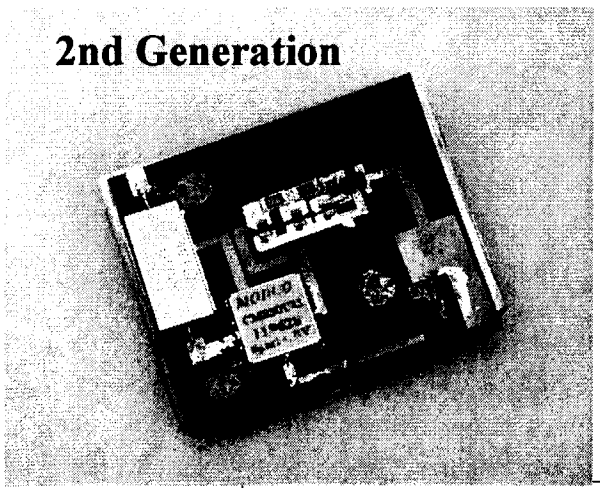
16.4 Grams w/o Shielding or Antenna

142 mW Output Power

Effectiveness and Survivability Tests Successful Against SPN-43



2nd Generation

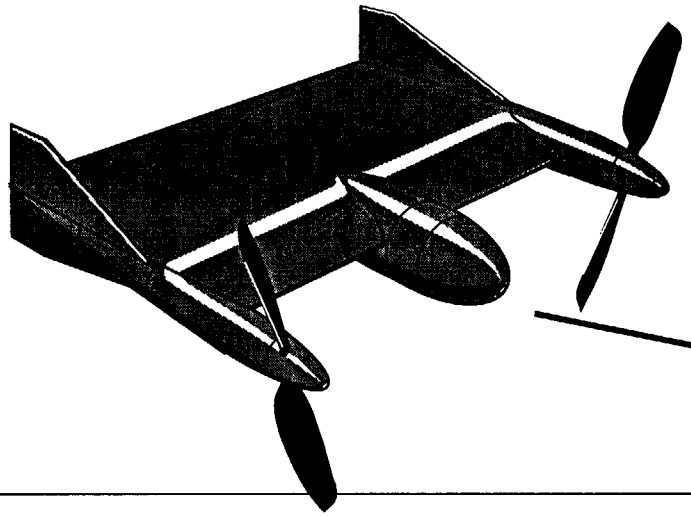


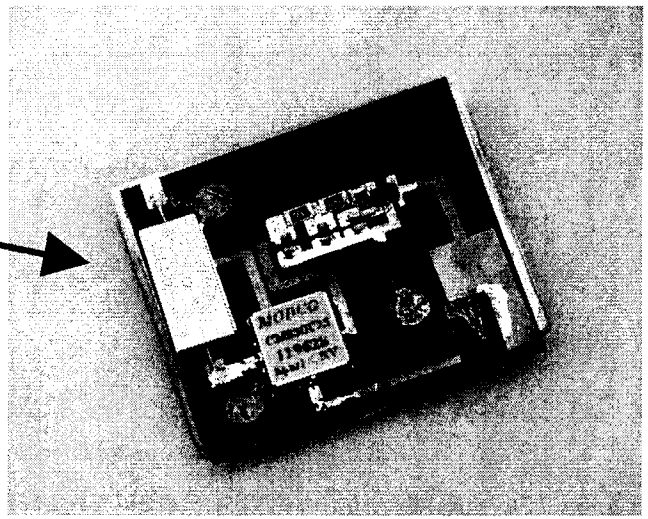
2nd Generation Prototype

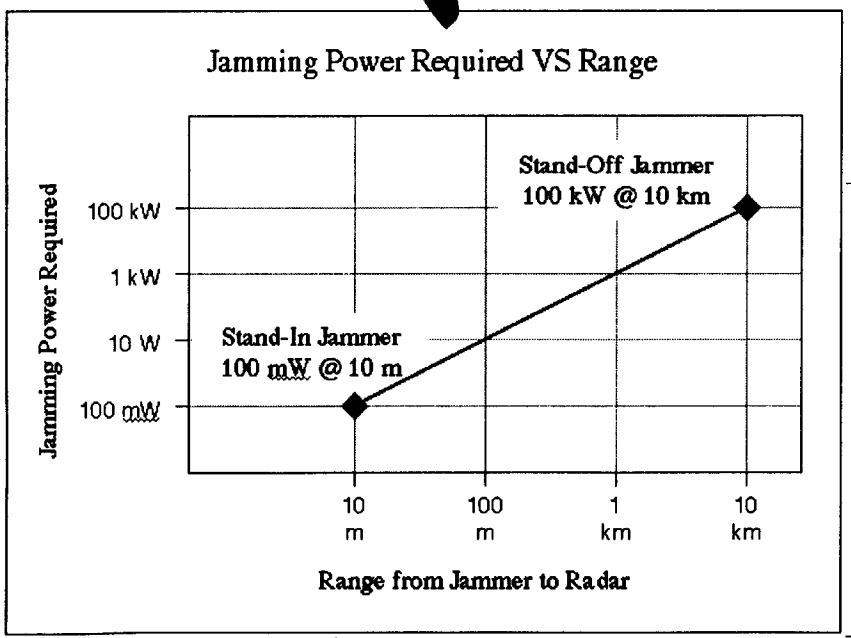
8 Grams w/o Shielding or Antenna

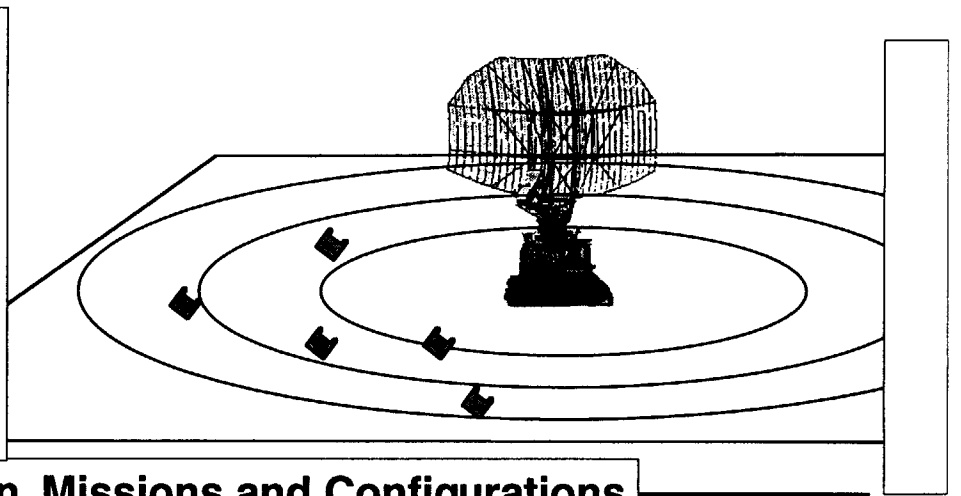
Powered by Two Lithium Flat-Pack Batteries (Behind Circuit Board in Picture)

Micro-Jammer



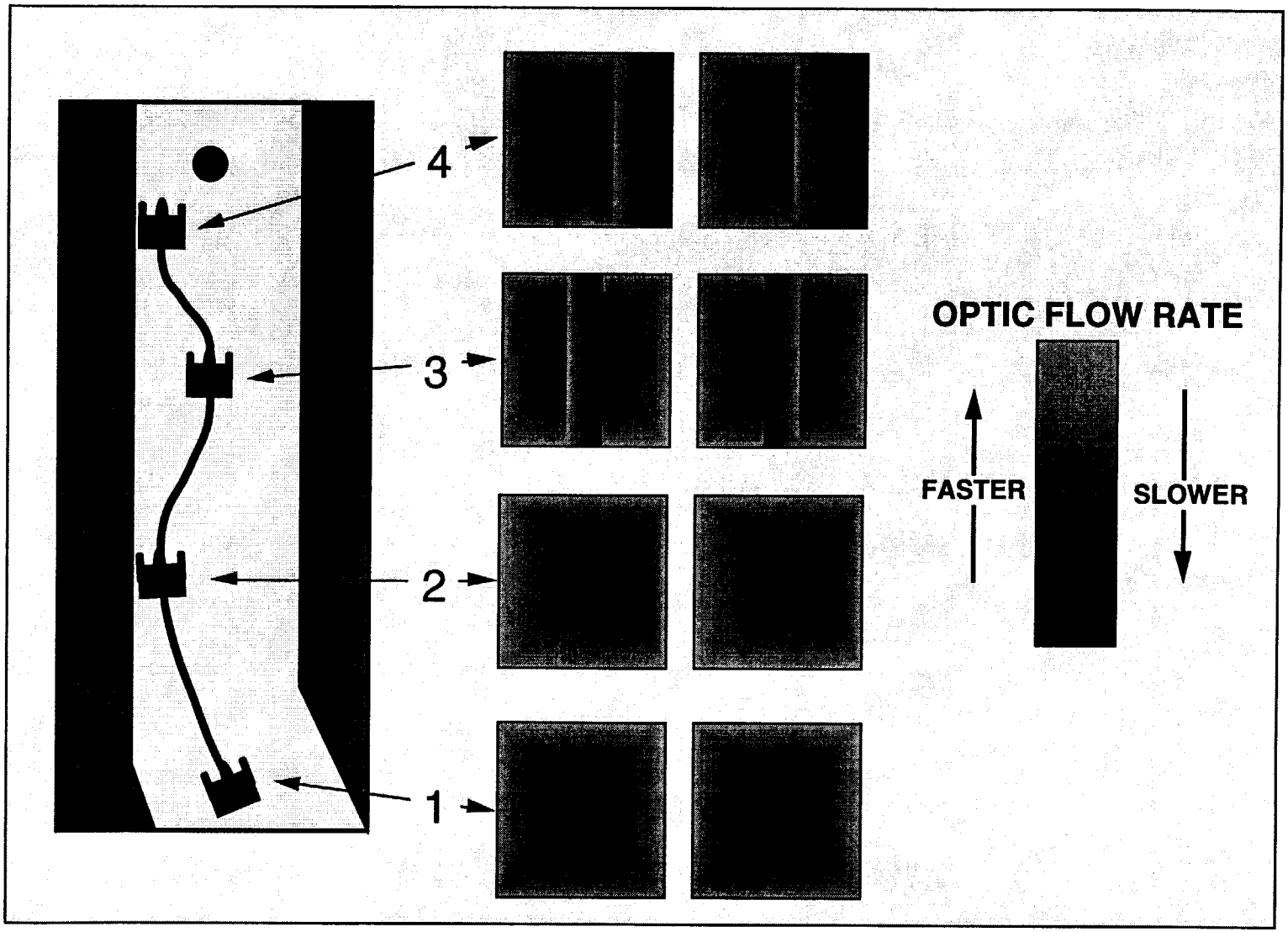






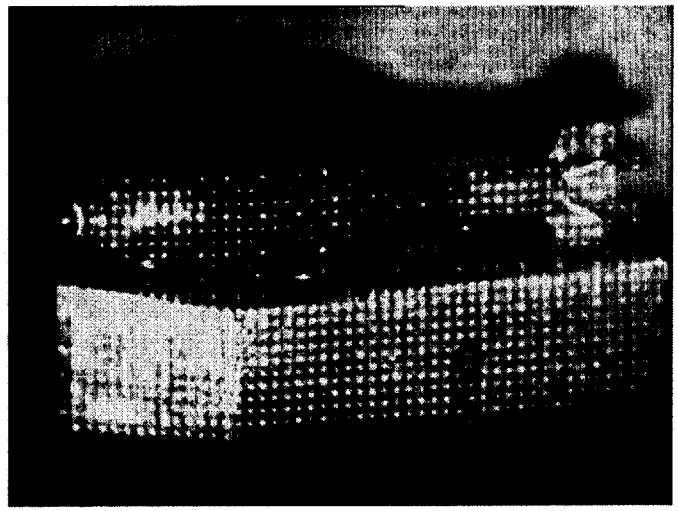
Alternative MAV Navigation, Missions and Configurations

OPTICAL FLOW for Collision Avoidance and Navigation



RANGE BASED VISION FOR NAVIGATION

QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture



AIRCRAFT CONFIGURATIONS

FLIGHT PERFORMANCE

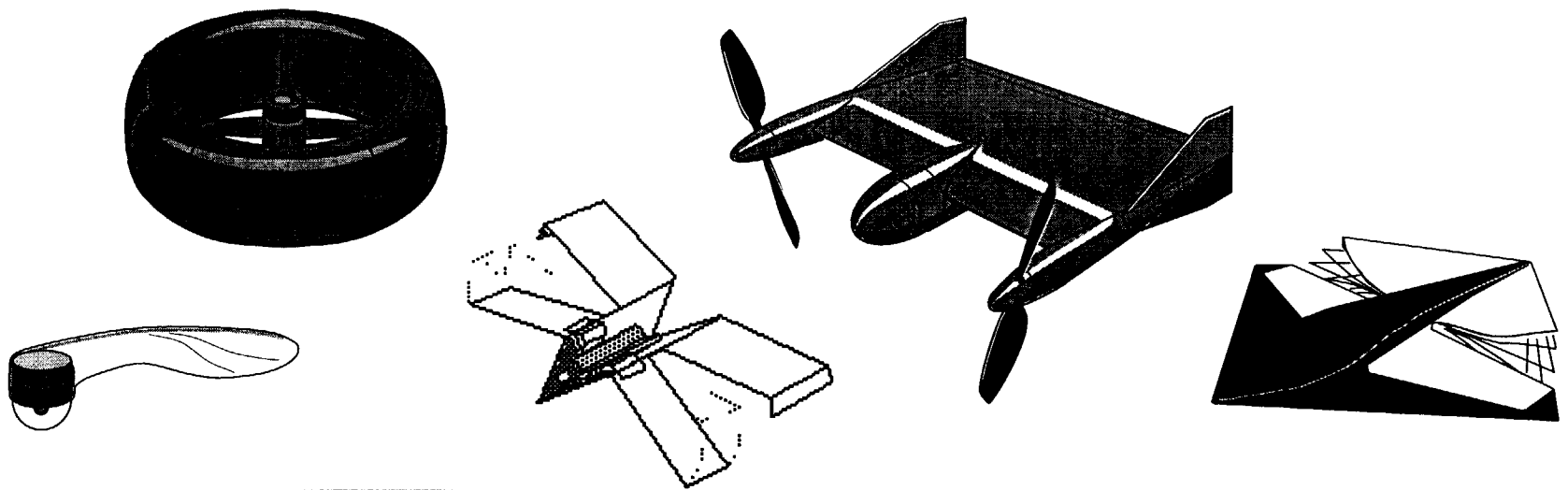
- PROPELLOR SIZE & LOCATION AFFECTS AERODYNAMICS
- FURTHER MINIATURIZATION (LESS THAN 15 CM) REQUIRES WING FLAPPING

PAYLOAD / SENSOR INTEGRATION

- VOLUME VS. MASS LOCATION TRADEOFFS
- AIRFRAME SHAPE AFFECTS ANTENNA PERFORMANCE
- AIRFRAME ITSELF MAY BE THE ANTENNA(S) & BATTERY / FUEL CELL

MISSION PERFORMANCE

- SHAPE DETERMINES DURABILITY, SURVIVABILITY AND PERSONNEL SAFETY



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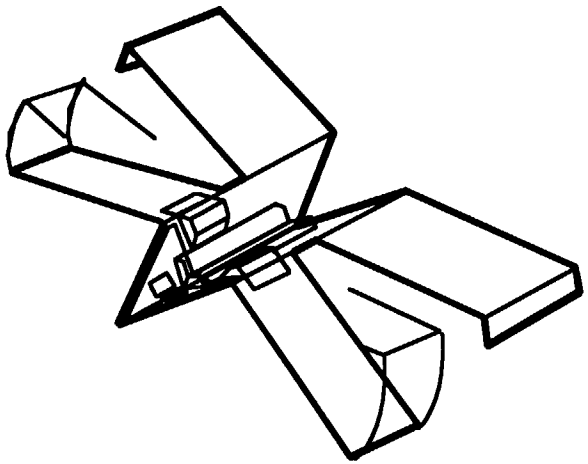
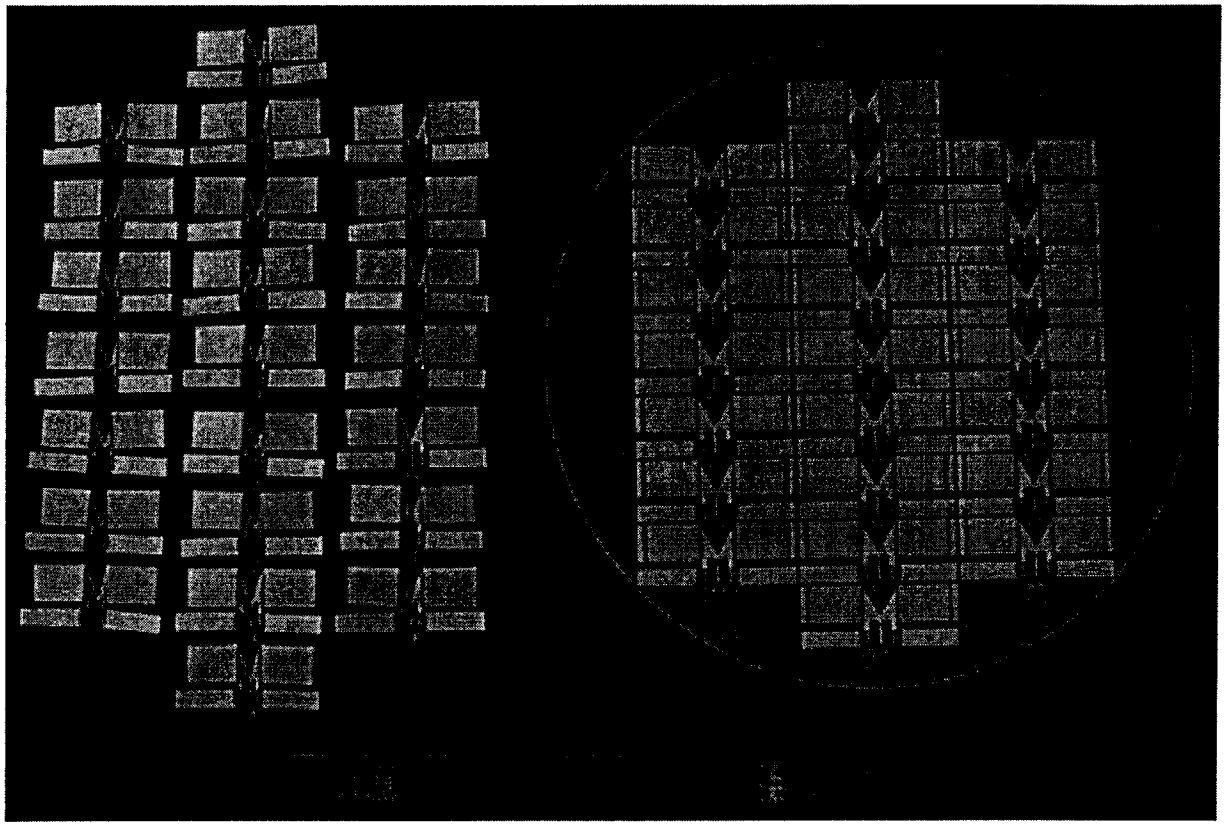
SILICON BUGS





- POLYIMIDE AIRFRAME
- 1 TO 2 INCH WINGSPAN
- 2M/SEC AIRSPEED
- 50 TO 200 MILLIGRAM WEIGHT
- THIN FILM PIEZOELECTRIC ZNO ACTUATORS
- PROPULSION AND CONTROL VIA FRONT WING FLAPPING